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prominence made its appearance, and in its spectrum Professor HALE found the line double, just as it ought to be. The observation was difficult, but others—in fact, all who had spectroscopes of sufficient power—soon confirmed it; so that now there can remain no possible doubt on the question of identity.

Professor RAMSAY has detected small quantities of helium in several other minerals besides the uraninites, in which it was originally discovered. Its presence in meteoric iron is especially interesting, where it is found associated with the hydrogen and and the various carbon gases which have long been known to be "occluded" in these celestial visitors.

The new element turns out to be, next to hydrogen, the lightest of all known gases, its density being about one-seventh that of air, or two on the hydrogen scale. Like hydrogen, it is never found free in our atmosphere; but unlike hydrogen, which in its combinations with oxygen and carbon is most abundant upon the earth, helium is extremely rare, and seems, like its associate, argon, to be almost without chemical affinities. Certain apparent coincidences between lines in the spectrum of argon and of this terrestrial helium seem to Professor RAMSAY to indicate either some third still unknown gas associated with argon and helium in the minerals from which they are obtained, or else some close and unexplained physical relation between the two.—Professor C. A. YOUNG, in *The Cosmopolitan*, November, 1895.

VARIABLE STAR CLUSTERS.

Professor SOLON I. BAILEY, in charge of the station at Arequipa, maintained by this observatory, has discovered from an examination of the photographs obtained by him of certain globular clusters, that they contain an extraordinary number of variable stars. This is not a general condition of stellar clusters, however; for in others similarly examined by Professor BAILEY, no variable stars have been found. The photographs used in this discussion were taken at Arequipa with the BOYDEN thirteen-inch telescope. In the cluster in *Canes Venatici*, MESSIER 3 (N. G. C. 5272), no less than eighty-seven stars have been proved to be variable from an examination of fifteen photographic plates. The change in every case is certain, and has been confirmed independently by Mrs. FLEMING and the writer from an examination of six of these plates. Sometimes the variation amounts to two magnitudes or more, and sometimes it does not exceed half a magnitude on the plates which were used for its confirmation. No star was included in this count, if either of the three observers doubted the variation. Nine other stars were found to be variable by Mr. BAILEY, but they are not included, since they did not show sufficient change on the plates used in confirmation. In like manner, from an examination of seventeen plates, Mr. BAILEY found forty-six variables in the cluster MESSIER 5 (N. G. C. 5904), which were confirmed on five plates. Fourteen other stars in this cluster are also probably variable, but have not yet been confirmed. This cluster is frequently described as 5 *M Libræ*, probably following SMYTH. It is actually in *Serpens*, and very near 5 *Serpentis*. Two variable stars have been confirmed in N. G. C. 7089, from an examination of six plates; three in N. G. C. 7099, from five plates; five with small range in N. G. C. 362, from three plates; and four in N. G. C. 6656, from three plates. On the other hand, a similar examination of two plates of each of the clusters N. G. C. 6218, 6397, 6626, 6705, and 6752 failed to detect a single variable star, several hundred stars in each case apparently having exactly the same brightness on both plates. As, however, these plates were taken within a few days of each other, only variable stars of short period could have been detected on them. In general, no variables have been found within about one minute of the center of the clusters, on account of the closeness of the stars. None of these variables are more than ten minutes distant from the centers of the clusters. In N. G. C. 5904, a circle 110 inches in diameter contains sixteen stars, six of which, or nearly forty per cent., are variable. In the entire cluster, about 750 stars were examined, and 46 found to be variable, as above stated; so that they form about six per cent of the whole. Of all the stars visible to the naked eye, less than one per cent were variable.

In 1890, Mr. PACKER discovered two variable stars in the cluster N. G. C. 5904. (*English Mechanic*, Vol. LI, 378; *Sidereal Messenger* IX, 380, 381; X, 107.) One of these variables was discovered independently by Mr. BAILEY, but is not included in the above lists. Several stars in this cluster were thought to be variable by Mr. COMMON. (*Monthly Notices*, L, 517; LI, 226). One of them is too near the center; the others too distant to be included in the above discussion. The variable star discovered in the cluster N. G. C. 5272 by the writer, in 1889, is also too near the center to be included.

Some of these variable stars have short periods, not more than a few hours. For instance, one of them, No. 12, which precedes the center of N. G. C. 5904 by about three minutes of arc. Five photographs of this cluster were taken on July 1, 1895, at intervals of an hour. The corresponding magnitudes of the variable as derived from these plates, are 14.3, 13.5, 13.8, 13.9, and 14.3. Four plates, taken on August 9, 1895, also at intervals of an hour, gave the magnitudes 14.2, 14.6, 14.8, and 15.0.

Right Ascensions and Declinations cannot conveniently be used for indicating the individual stars in close clusters. They can only be found readily from photographic or other charts on which they are marked. Such charts are now being prepared for publication in the Annals of the Observatory. Meanwhile marked photographs will be sent to such astronomers as may wish to study them. Edward C. Pickering.

November 2, 1895.
Harvard College Observatory, Circular No. 2.

Translation of Aratus.

Mr. C. Leeson Prince, Director of the private observatory at Crowborough, Sussex, England, has translated the poem of Aratus,—"The Phenomena"—and has had it privately (and very neatly) printed and bound under the title, *A Literal Translation of the Astronomy and Meteorology of Aratus*, with some bibliographical remarks. Lewes, 1895, quarto, pp. viii, 82. The edition is limited, and has been distributed to correspondents of Mr. Prince. E. S. H.

Elements and Ephemeris of Comet *a* 1895 (Swift), by Professor A. O. Leuschner.

"The following elements computed by Professor A. O. Leuschner, assisted by Mr. W. H. Wright, from observations made by Professor E. E. Barnard, August 21st, 22d, and 23d, were received by mail. Although telegraphed from California, August 26th, their publication was delayed, owing to three wrong words in the telegram:

$$T = 1895 \text{ August } 16.4510, \text{ G. m. t.}$$

$$\left.\begin{array}{llll} \omega = & 164^\circ & 1' & 33'' \\ \Omega = & 172 & 32 & 40 \\ i = & 3 & 38 & 4.5 \end{array}\right\} \text{Mean Equin. 1895.0.}$$

$$\log q = 0.142716$$

Correction to Ephemeris, September 3d (from observation by Professor Boss, Albany), was $+15^s$ and $-0'.7$." —From the *Astronomical Journal,* No. 355, October 2, 1895.

Note on the foregoing, by Edward S. Holden.

The phrase "three wrong words in the telegram" does not make it clear that the message in question was correctly sent from California, as it should do. As a matter of fact, the cipher telegram was correctly written at the LICK Observatory on August 26th (by Professor CAMPBELL), it was telephoned to San José and correctly received there, and it was correctly transmitted eastward by the San José office. Professor LEUSCHNER was notified of the facts as given above by letter dated September 2d,* immediately after receiving information from the Harvard College Observatory that the message as delivered to them on August 26th contained three wrong words.

A NEW STAR IN *CENTAURUS.*

A telegram just received from Professor PICKERING, of the Harvard College Observatory, states that Mrs. FLEMING, of that observatory, has discovered a "new star" in Right Ascension $13^h\ 34^m$, Declination $-31°$. It is described as eleventh magnitude, fading. It is 30 seconds north-following the nebula New Gen. Catal. 5253.

LICK Observatory, 1895, December 17.

THE HERSCHELS AND MODERN ASTRONOMY. By Agnes M. Clerke. (The Century Series.) Cassell & Co., London, 1895. 16mo, pp, 224, with three portraits.

Under this title, Miss CLERKE has ten chapters, five of which deal with the career and influence of Sir WILLIAM HERSCHEL, one with the life of his sister CAROLINE, and four with the life and labors of Sir JOHN. Miss CLERKE has, of course, consulted all previously published information, and has also had access to many of the unpublished papers of the family Like all others who have had occasion to study the writings of these astronomers (and who has not?), she notes the "conspicuous gap in scientific literature," due to the fact that no collection of their works is yet available to students. Their writings must still be sought in the

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* Thirty days before the publication in the *Astronomical Journal.*